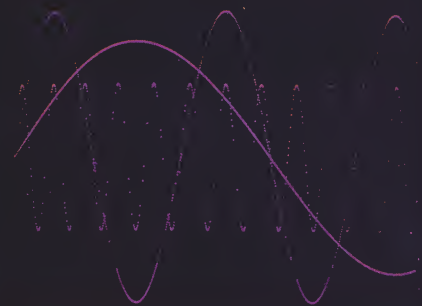
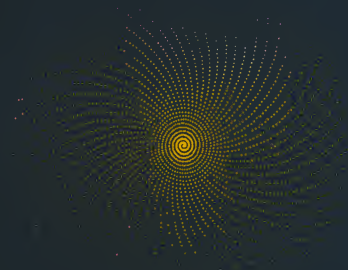
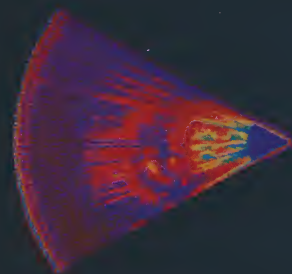




CURVES



PLOTS



IMAGING

SIGGRAPH 79

High-Resolution Computer Graphics Interface*

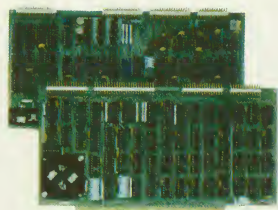
Engineering - Science - Business - Education - TV

- Produces the industry's finest displays
- Equals or exceeds color TV resolution
- 4096 color choices

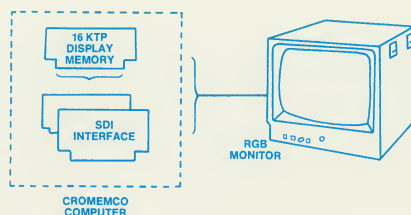


Cromemco

Tomorrow's computers now



**Model SDI
Color Graphics Interface**



New SDI interface plugs into existing slots in any model Cromemco computer. Shown here is new Cromemco Z-2H computer which contains 11 megabytes of hard disk memory and two floppy disk drives.

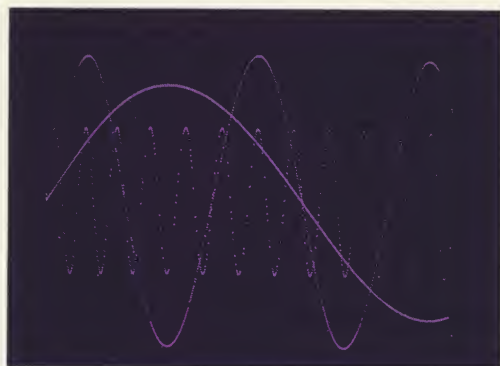
The industry's most versatile method for displaying computer memory content in almost unlimited color choices

Here's a graphics interface that gives you high resolution, simplicity and an enormous range of color choices unmatched in the industry.

The new Cromemco Model SDI Color Graphics Interface is a fully-integrated way to display the memory content of Cromemco computer systems in beautiful and meaningful color choices. See, for example, the accompanying photograph of an ultrasonic sector scan of a human heart which was displayed using this new SDI interface. Use of color and the high resolution of the image facilitate reading the display by researchers in the field. To simplify examination or discussion, various parts of the scan can be displayed in any of a wide range of colors—4096 to be specific. Other examples are shown herein.

The interface consists of two circuit cards that plug directly into any Cromemco computer. No alteration of the computer is required. All necessary outputs to the monitor are provided by the interface.

The display device is typically an RGB Monitor, used in the industry or available from Cromemco (Model RGB-19).



Very high resolution provided by the new color graphics interface is apparent in this plot of sinusoids.

HIGH RESOLUTION

The new SDI interface can be used to display images with up to 756 x 484-point resolution. As discussed later, this resolution is at least the equal of a high-quality broadcast-TV picture.

COLOR OR B/W

The new interface can be used to display an image in either color or black-and-white—or in both simultaneously.

In color any 16 colors from a choice of a palette of 4096 colors can be used in the picture. In black-and-white any 16 shades of gray can be used.

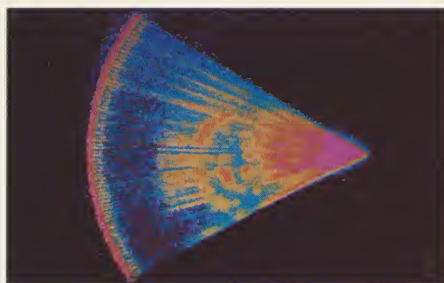
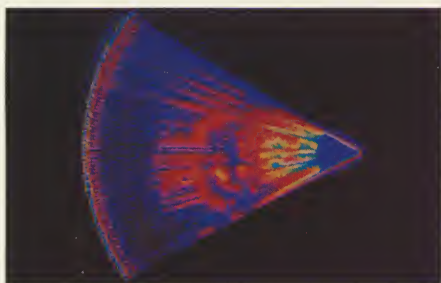
HOW THE SDI MAPS

The SDI uses direct memory access to display the content of a display memory. Each pixel of the display may be mapped either from one nybble (4 bits) or one bit of the display memory. The mapping mode (nybble or bit) is software-selectable—in fact, part of a picture may be displayed in one mode and part in the other.

The display memory may consist of either a 12K or 48K memory.



Bar patterns suggest the wide variety of colors that can be selected for displays. From a palette of 4096 colors 16 can be used in one display (or 16 shades of gray).



Display of cross section of human heart imaged by a 2.25 MHz ultrasonic sector scan through body's intracostal space. The image is displayed using the new SDI interface on an RGB Monitor. This medical application

involving the new interface was done at Stanford University. These three pictures indicate how the choice of colors or black-and-white available using the interface can be selected to suit various end purposes.

The combinations of mapping modes and memory result in four basic modes of operation as shown below.

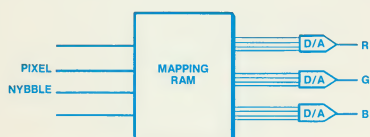
MODEL SDI RESOLUTION (HORIZONTAL x VERTICAL) IN EACH OF FOUR MODES OF OPERATION.

Display Memory Size

	12K	48K
Nybble-Mapped	189 x 121	378 x 242
Bit-Mapped	378 x 242	756 x 484

SDI OUTPUTS

The Model SDI provides three separate analog output signals to drive the Red, Green, and Blue guns of a high-quality RGB monitor. The three separate outputs, rather than one composite output, are used to preserve the full resolution of the picture.



In nybble-mapped operation each 4-bit nybble can select one of 4096 colors as determined by a mapping RAM. The contents of the mapping RAM can be changed dynamically, under software control, by issuing OUTPUT instructions to the SDI.

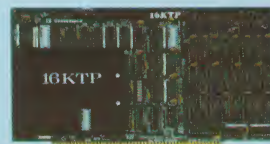
For black-and-white work any one of the three outputs can be used to drive a black-and-white monitor. In fact, all three outputs can be used to display simultaneously three totally different pictures to three different black-and-white monitors.

Both a separate Sync output and a composite Sync signal that is switch-selectable on any of the three analog outputs are available from the SDI.

TV COMPATIBILITY

The Sync signals mentioned above adhere strictly to the RS-170 standard for the TV broadcast industry.

The Model SDI also provides all signals required to serve as input to a colorizer or color modulator in a TV broadcast studio. In addition, the Model SDI can be synchronized to external TV equipment through the use of an external composite RS-170 Sync signal, a composite video signal, or external horizontal and vertical Sync signals applied to the appropriate SDI inputs.



DISPLAY MEMORY

A new 16K two-port memory card has been developed for use with the SDI. Three of these memories thus hold a full 48K picture. Picture information is accessed by the SDI through a connector on the top of the memory cards. The cards plug directly into the Cromemco computer.

The computer resident memory may also be used as the display memory, although at the expense of mapping speed. This reduction occurs because the CPU must suspend operation when the SDI accesses the resident memory. The result is approximately 55% CPU utilization for a 12K-memory picture and 6% utilization for a 48K-memory picture.

Use of the special two-port memory, however, assures 75% to 100% CPU utilization, depending on the application software.

DESIGNED TO SURPASS TV QUALITY FOR LONG-TERM APPLICATION

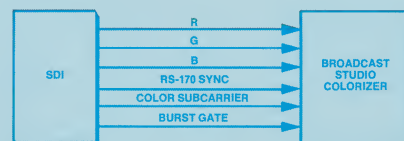
In its high-resolution mode, the SDI* displays a picture having a 756 x 484-pixel resolution. This format corresponds to and is compatible with NTSC TV systems practice in that 484 lines are normally displayed in a nominal 525-line system. The 756 points in the horizontal direction give a resolution equal or better than that of the vertical direction.

The horizontal resolution itself far exceeds that of conventional TV displays which have relatively limited bandwidth.

The result of the above approach is that the high-resolution picture displayed using the SDI interface is at least equal in resolution to a 525-line color TV picture. (Further, the SDI has other features so that it can be used with color TV systems where special control of color may be desired as in character dubbing, etc.)

It should also be noted that if desired the full resolution of the Model SDI can be achieved in each of the three colors by using one SDI in each color input to the monitor. Provision is made in Cromemco computers to be able to run more than one SDI in them.

*Covered by U.S. Patent No. 4121283, "An Interface Device for Encoding a Digital Image for a CRT Display."



The SDI supplies all signals required to meet broadcast signal specifications in television work.



RGB MONITOR

New Cromemco RGB (red/green/blue) Color Monitor is specially adapted for use with SDI interface. Photos shown herein are from this monitor.

GUIDE TO CROMEMCO GRAPHICS INTERFACE PRODUCTS

Besides the high-resolution SDI interface described in this brochure, Cromemco also offers the Model CGI interface for applications where low resolution is satis-

factory. The CGI offers from 128 x 128 to 32 x 32 pixel resolution using only 2K to ½K of memory. The performance of each interface is summarized in the table.

RESOLUTION (Horizontal x Vertical)	CROMEMCO INTERFACE MODEL	BIT-MAPPED OR NYBBLE-MAPPED	DISPLAY MEMORY REQUIRED	INTERFACE PRICE
32 x 32	CGI	NYBBLE	½ K	\$350
64 x 64	CGI	BIT	½ K	\$350
64 x 64	CGI	NYBBLE	2 K	\$350
128 x 128	CGI	BIT	2 K	\$350
189 x 121	SDI	NYBBLE	12 K	\$595
378 x 242	SDI	BIT	12 K	\$595
378 x 242	SDI	NYBBLE	48 K	\$595
756 x 484	SDI	BIT	48 K	\$595

TECHNICAL SPECIFICATIONS

Model SDI Color Graphics Interface

Mapping modes: Bit or nybble; software selected

Resolution: 756 x 484 pixels maximum using 48K display memory. 12K display memory may also be used at lower resolution; see text.

Color: Any 16 of 4096 colors or any 16 shades of gray may be displayed.

Outputs: Three analog outputs for R.G.B. monitor

Recommended Display Memory: Cromemco 16KTP two-port memory.

Sync signal: Composite Sync signal is switch-selectable. Separate RS-170 Sync signal available.

System Bus: Industry Standard S-100

Operating Environment: 0-55°C

Price: \$595

CROMEMCO RGB-19 COLOR MONITOR

Max. effective screen size: 396 mm x 297 mm

Technology: All solid state except for CRT.

CRT: 19" shadow mask, delta gun

Video signal input: RGB 0.3 - 2.0 v., 75 ohm. Fully compatible with Cromemco model SDI interface outputs.

Video amplifier bandwidth: 50 Hz to 15 MHz ± 3 db

Power requirements: 100, 110, 120, 220, or 240 volts, 50/60 Hz.

Power consumption: 250 VA

Dimensions: 444 mm x 482 mm x 545 mm

Weight: 45 Kg

Operating environment: -5° to 40°C

Price: \$6995

Model 16KTP Two-Port Memory

Memory Capacity: 16K bytes

Bus: Industry standard S-100

Operating Environment: 0-55°C

Price: \$795

Prices f.o.b. Mountain View, CA
Data subject to change without notice.



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